DOCUMENT RESUME

ED 229 548 CE 035 742

AUTHOR Frankel, Alan; Brennan, James
TITLE Structuring an Adult Learning Environment. Part IV: Establishing an Environment for Problem Solving.
PUB DATE Mar 83
NOTE 16p.; Paper presented at the Western College Reading Association Conference (Portland, OR, March 1983). For related documents, see ED 199 658, ED 210 624, and ED 216 196.
PUB TYPE Speeches/Conference Papers (150) -- Information Analyses (070) -- Viewpoints (120)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Adult Education; *Adult Learning; Adult Programs; Discovery Processes; Learning Problems; *Learning Processes; Learning Theories; *Models; Postsecondary Education; *Problem Solving
IDENTIFIERS *Mercy College NY; Wallas (G)

ABSTRACT

Through the years, many researchers have advanced theories of problem solving. Probably the best definition of problem solving to apply to adult learning programs is Wallas' (1926) four-stage theory. The stages are (1) a preparation, (2) an incubation period, (3) a moment of illumination, and (4) final application or verification of the solution. The four stages proposed by Wallas can serve as the foundation for building a supportive learning environment that will allow for creativity and problem solving for adults returning to learning situations. Such an approach has been tried in the Psychology 100 course at Mercy College (Dobbs Ferry, New York). In this course, a case is presented before the class and the steps of problem solving are used to find solutions to the conflict or problem in the case. Emphasis is placed on generating multiple possible solutions instead of looking for the one right answer. It is felt that this approach will carry over to other courses and help the adult learners to solve learning problems. This supportive approach to adult learners may enhance their chances for success and the college's chances to retain them as students. (KC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

MERCY COLLEGE
555 Broadway, Dobbs Ferry, New York 10522 · (914) 693-4500

ED229548

Structuring An Adult Learning Environment
Part IV:
Establishing An Environment For Problem Solving

Alan Frankel & James Brennan
Department of Psychology

March 1983 Western College Reading Association Conference
Portland, Oregon

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
✓ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
A Frankel
J Brennan
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

CE 035742

Since the start of these lectures on how to better structure an adult learning environment, colleges have found their adult populations increasing and the need to provide services for this new body of students ever more crucial. With severe restrictions imposed by an economy riddled by budget cuts, aggressive admissions officers have sought to reduce the attrition rate of their institutions by luring the adult back to the hallowed walls of academia. Often it was the promise of a program without the reality of anything concrete or substantially different from the programs already in progress. Since then serious reconsideration of how to lure, aid, and support the adult population has taken place.

This article will review the first three parts of what appears to be a continuing series on "Structuring An Adult Learning Environment" and then will continue with Part IV: The Adult As Creative Learner.

In Part I, the author did not project the need for such a series; therefore, it was quite global in its offering. First, it described advancements of Mercy College, a four-year, public institution in Westchester County, New York. The administration, under Donald Grunewald as president, saw the time restraints placed upon adults. To meet this challenge classes were arranged on eight as well as sixteen week semester offerings. A midnight shift at a local GM plant was tested as a means of directly offering what both employer and employee saw as immediate needs. Branch and extension campuses were opened giving Mercy the "strikeforce" image as daring to break the traditional walls of the institution and bring education to those who might have to otherwise travel great distances or totally re-arrange their daily schedules to meet those of another institution. Mercy has kept its tuition rate as modest as possible allowing those to afford it and make fewer financial sacrifices.

Second, the initial article told of non-credit courses designed to diagnose and remediate reading problems the adult might have after a long absence from education. In a "test-

operate-test-exit" fashion, similar to the work done by Miller, Gallanter, and Prebrum (1960), the adult was tested for abilities and then diagnosed for remediation so as to either "resharpen" old skills or introduce new, more efficient ones.

Finally, the first article pointed towards the instructor as being sensitive to the individual's goals. The adult was seen as being in need of setting realistic long and short-term goals that had tangible value as well as support to "run the distance" of the marathon race of the four-year degree. This was partially accomplished via a six-step procedure based on advanced organizers as proposed by David Ausubel.

These same three points were expanded upon but viewed in the frame of reference of both tutor and teacher in the second article, "Part II: Teaching Versus Tutoring - The Support Services." As the adult was to return after an absence from active learning, the support services were seen as part of the "lure" to ease anxiety, and as part of the "substance" to promote success. Mercy College, as well as many others that discussed this necessary element at the New York College Learning Skills Association meeting in November of 1981, saw the tutor as a vital link between student and instructor.

One of the key differences between the tutor and teacher was that the tutor's job was one of clarifying and reinterpreting material that was presumed to have already been taught by the instructor. Teaching was assumed to have already taken place. Unlike the instructor, the tutor is able to address a singular need. This action, along with clarifying and reinterpreting, is seen as being separate and distinct from the process of teaching.

Another point made by this article was the importance of Andragogy. It was said that the student must be seen as an autonomous individual, who, as such learns best while taking an active, rather than passive, part in curriculum development. The student was pictured as having long-term and short-term goals that seemed contradictory at times, but when laid on a matrice that pointed towards graduation

these goals were seen as overlapping and having slight differences in order to accommodate each other.

Malcolm Knowles was invited to Mercy College in order to assist in his "self-directed learner" style, new instructors and instructors already working with adults. As a point of departure, Mercy College was able to offer greater easement for the returning adult by considering options that included greater student input in the setting of the curriculum, contract learning, and alternative styles of teaching.

A third point made by this second article was the result of many intensive meeting between tutor and teacher. It was a listing of seven assumptions about the learning process. The assumptions were in further support of Andragogy and highlighted the adult's individual needs in terms of time and practice requirements, pacing, direct and indirect involvement by the teaching faculty in tutorial sessions, mastery learning (also called skill competancy), and statements about the affective domain of learning and the part played by both tutor and teacher.

The last article, "Part III: The Team Approach," stressed the role of transference in accomplishing learning. Varied styles of teaching were assessed and compared as the team approach to instruction was viewed as a way of making learning more meaningful. The "team" was not composed of tutor and teacher only. Vital to the team were the peer counselors, admissions people and guidance personnel, and any counselor who would assist by giving information to the returning adult. It was felt that first impressions <u>do</u> make a difference and the orientation day was a time when informal meetings with staff at all levels was important.

This same article focused on anxiety reduction as a product of the total team approach, the effects of which would increase the possibilities of learning and performing. A few of the anxiety theories and theories of personality were cited as a means of substantiating the need for anxiety reduction.

Problem Solving: A History

Most historians of psychology date the birth of the study with Wilhelm Wundt's 1879 studies of Structuralism in the Leipzig laboratory. This is a fair starting point, for psychology was then respected as a science that would systematically quantify all of human experience. It was to Wundt's credit that he dealt with structure and function, for that which was tangible and readily studied was accepted. It was to his demise that the process of introspection bordered on tapping the mysterious "black box" of the mind, that intangible area that Wundt felt could not legitimately be studied by a true investigative science.

It is of no surprise that Watson and Skinner would be next in lineage to study the human experience through a mechanistic interpretation. This new approach, Behaviorism, saw man as a kind of machine that responded to stimulii without thinking. Since thinking was an internal process, a behaviorist found himself without the vocabulary to describe or study this phenomenon. All stimulii came from the external world. Each stimulii would have its own unique response or a particular response it could be conditioned to direct; each little part would be called a MOLECULAR behavior that would describe the larger MOLAR behavior.

The Behavioristic model was supported by a mathematical model. It was in antithesis to a Gestalt approach that saw the whole as being greater than the sum of its parts. Perception was an internal structuring of information and was explained by Kafka, Kohler, and Wertheimer in terms of contiguity, clozure, proximity, and similarity. It was this global school of study that allowed for an understanding of the processes of cognition, and then the study of problem solving was a natural offshoot. The understanding of problem solving was a cicrocosm of the ontology of psychology.

Associationists saw the act of problem solving as a process of making meaningful connections. Jerome Bruner (1977) described problem solving as a freedom to be dominated by creation and although quite modern in interpretation, his associationistic stance saw the creation of a 'product' or a new rule or concept that had the quality to surprise. It was an integrative ability that had, at one level, the predictability

of outcomes as the information was concrete in nature and was subject to causal relationships. On the second level, it was metaphorical and had symbollic referents. On the third level, it was formal in terms of abstract, affective qualities. The environment produced an arena for discovery learning wherein the cognitive structures would have coding systems.

Bartlett described the same phenomenon as 'adventurous thinking' and saw product as a reorganization and change. Extrapolation was possible in an environ that promoted risk-taking. The new information, which might only be a new awareness of old information, would form structures and a 'schemata.' Mednick, too, saw these combinations of associations and described them similarly by their associative elements, associative hierarchy, and fluency. Fluency later became a gateway to 'brain-storming,' a product of Osborn's (1953) work. The leap from Associationism to Behaviorism followed the development of psychology. Staats (1964) described the phenomenon as starting with two unrelated s-r bonds that would later be paired by contiguity. The product was a novel response or combination. A problem, by this definition, would exist when a response does not result in a satisfactory outcome. Similarly, Behaviorism sought to use satisfying outcomes as reinforcements of behavior. Thus, a rearranging of a hierarchy of responses was required.

The habit hierarchy was studied by Maltzman (1955) who distinguished between divergent and convergent thinking. Through a trial and error system, the product would be one of creativity and originality. This explanation fit the philosophy that had been developed to date. James (1880) saw creativity as an adaptive significance in a capacity for equivalence grouping. Hull's environment was one wherein inhibition subtracted from a potential to solve problems. One could learn a habit of avoiding or not responding. Even Skinner (1971) defined creativity and problem solving as changes in structure that were selected because of consequences. Rather than label it creativity, he preferred to define a trial-and-error approach where chance events from natural selection arose. Schultz (1960) made the quantum leap to transfer of training in order to reduce inhibition and produce more s-r connections that would be generalizable. Insight, then, was merely an s-r bond.

Duncan (1958) studied transfer of training and saw the opposite side of the coin: FUNCTIONAL FIXATION. For him, the creative environment was one

in which a person could train on a variety of tasks. The well-known exercises of problem solving via combinations of pails of water deal with remediating fixatedness and are the work of Luchins (1942). Maier (1940) used the transfer of training model in a classic experiment in which one had to connect two suspended ropes or strings that were a distance apart.

Psychoanalysis also had its impact on the study of problem solving. In a Freudian tradition, Kris (1950) wrote of 'regression in the service of the ego' and saw the activity of problem solving as an inspirational phase. There was a facility with which id impulses were received. It was followed by an elaborational phase, a cathexis directed to other ego functions. This was exemplified by a reality testing, formulation, or general communication. In the same tradition, Kubie (1958) saw problem solving as a neurosis that was related to creativity. For him, creativity was positioned between the conscious and the unconscious. The preconscious saw a continuum of mental life. It was the Gestaltists, again those who saw experience as being larger than just a cumulative factor, that added greater definition to the process of problem solving. Kohler (1925), mentioned earlier in light of his contribution to the understanding of perception, did classic examples wherein monkeys were seen as tool-makers and tool-users. The implication is that the monkeys had insight and were able to generate new rules to solve a problem. Creativity was seen in their greater opportunity to take elements and connect them in novel ways that were uninhibited by the conscious. Similarly, Wertheimer (1945) showed that bits and pieces could be arranged into a larger whole. His creative environment was a struggle between productive and reproductive actions. Schachtel (1954), a gestaltist and a reconstructionist, saw development as a progression from autocentric perceptions of the child to allocentric perceptions of the adult. The essential element was the open mind. Similar to Freud's definitions, Schachtel used AUTOCENTRIC to mean subject-centered sans objectification, and used ALLOCENTRIC to refer to needs to relate to the world: object-centered orientation. Unlike Kris, who viewed this phenomenon as an immaturity, Schachtel saw it as the generating of rules and the losing of self in the process.

THE PROCEDURE OF PROBLEM SOLVING

First, a distinction must be made between the four types of problems.

PUZZLE INSIGHT is more abstract than REAL-LIFE problems. The latter relevant type may be viewed as often being situational and likely to be solved by knowing a system or manipulating control that has a more definitive quality. A third kind of problem is one in which the PROCESS is alterable. It is vastly different from the last type, COMPONENT, which maintains a process but changes the parts.

The procedures of problem solving are as varied as the theories which attempted to delineate them. Spearman (1930), known for his work in the field of intelligence, likened the noegenetic principles to intelligence as he saw them. He felt that the first was an ability to apprehend the world, then an ability to establish relationships. Finally, one who was a problem solver saw a correlation to the objects beyond immediacy. How different is this from Wechsler's (1958) later definition of intelligence as being a global ability to (a) think rationally, (b) act purposefully, and (c) deal effectively with the environment?

Dewey, a founding father of American education, saw problem solving in five steps. There was a need to sense a difficulty that was similar to the Spearman idea of apprehension. This could be said to be a process of defining the problem. Dewey then went on to an idea of locating the problem or placing it in relation to one's self - perhaps similar to Schachtel's allocentric mode. Dewey's third step was to suggest solutions and, fourth, to consider the consequences. This would provide feedback and redefinition. The last step was the accepting of a solution as being one that was satisfying in solving the problem.

Stein (1974) used a scientific model that appears to be more condensed. It is the formation of a hypothesis, a stage of hypothesis-testing, and a final communication of results. Unlike the others, it does not appear to lend itself to feedback and immediate altering of possibilities. A more modern interpretation of Stein is Davis (1981), whose AUTA system deals with overt and covert processes. The mneumonic device stands for (a) an Awareness of creativity, (u) an Understanding of the nature of creativity, (t) an acquisition of Techniques, and (a) an increase in Actualization of potential. Unofrtunately, his description is undercut by its vagueness and lack of clear direction.

Probably the best definition of problem solving is Wallas' (1926) four-stage theory. The steps are: (1) a preparation, (2) an incubation

period, (3) a moment of illumination, and (4) final application or verification of the solution. One can see its relation to the scientific method as well as its inclusion of feedback. It is truly a cognitive model in the sense that illumination is primarily a reflexive stage and an abstract utilization of rules and new combinations of rules. Educationally, it is the most useful of those described to put into operation. What needs to be inspected is the environment for problem solving and the removal of those inhibitory factors that limit the incubation process. For the adult learning environment, many of these are not physical or tangible. The greater problem may lie in the internal psychological blocks or the negative feelings about self housed in the magic 'black box' into which Wundt preferred not to delve.

STRUCTURING AN ADULT LEARNING ENVIRONMENT: PROBLEM SOLVING

The four stages proposed by Wallas can serve as the foundation for building a supportive learning environment that will allow for creativity and problem solving. The first stage, PREPARATION, cab be viewed in terms of internal and external readiness. Externally, the environment must be one that allows for acess of information. This, of course, means that there is a facilitator to direct the adult towards a tangible source such as the library, but it also means that the environment is one that fosters growth by removing the obstacles. If, as Osborn suggested, fluency is a boon to problem solving, then external feedback may serve as a retardant as it will stiffle the incubation of ideas as 'qualifiers' of good or bad are placed upon possible suggestions. In another sense, if people in the environment offer criticism, it may be viewed as pointing the adult toward a situation of 'right' or 'wrong' answers. Again, the idea is to generate as many possibilities and allow the judgmental process to take place later.

Also part of the initial stage is reducing the amount of self-talk that inhibits. The adult is viewed as being in a position of androgogy and is deemed fully competant and able. Risk-taking is decreased when there is a fear of criticism or reproval for a wrong answer. The first stage, in summary, is one of removing limitations and boundaries from the physical and perceived environment. These factors feed into the next stage.

INCUBATION may be viewed as a continuation of preparation. Technically,

Wallas intended it to be a formulation of hypotheses. In order to do this, Knowles (1978) and Kidd (1973) propose the necessary difference between divergent/convergent or line/point thinking. The basic strategy for problem solving is to allow for many paths to solve the problem rather than rely on just one method. A point is limiting in that it is unidimensional. A line is a two-directional configuration made up of a series of points. Holt in his many writings brings to mind the fact that education in America has trained many non-thinkers to come up with the one correct answer that will satisfy the instructor and perhaps make test marking easier. We have sacrificed originality and creativity in the process and have instilled the notion that there is only one acceptable way to solve a problem. Through free association many ideas are to surface, but this cannot happen if the adult is going to search for the one acceptable answer.

The notion of free association is dependent upon memory. Although the literature varies on its response to this matter, there are two major strands of thought: (1) there is a natural physical decaying of the memory cells, but (2) and adult's capacity to use memory can be facilitated by mneumonic devices. Loftus (1980) and Mayer (1981) review the differences between semsory, short-term, and long-term memory, but also suggest a rather new dimension called the working memory. It appears to be a construct that is closely tied to the short-term memory and also has a limited capacity. Mayer uses the analogy of a "scratch pad on which you perform conscious mental operations such as mental arithmetic." The adult learner has little problem with this working memory in formulating hypotheses during this stage.

It is the application of this solution, the product of working memory, that is the function of Wallas' third stage, ILLUMINATION. The 'Eureka' or 'aha!' is the element of surprise that Bruner wrote of (1977) and is the result of reality-testing. The question is one of defining whose reality it is and if there is only one reality. Thus, problem solving for the adult may be seen as applying a particular solution to one circumstance and another solution to a different event; the problem may be the same, but the experience and perception may be different.

The testing of solutions and reality cannot be considered complete unless some feedback is offered so that further definition of reality or the problem can be made. As with the scientific model, the end of the problem solving task is not only with the solution of the immediate problem, but with the development of future questions to be considered.

A WORKING MODEL OF THE MODEL

The basis for the articles "Structuring An Adult Learning Environment" has been the implementation of curriculum in the course PSY 100: CRITICAL READINGS IN PSYCHOLOGY offered at Mercy College in Westchester County, New York. In inviting the adult to return to education after an absence, Mercy has recognized the varied needs and concerns of the adult learner. This course purports to work with the improvement of reading, study, and vocabulary skills while introducing the student to the content of the field of psychology. What it does is much more: it encourages thinking and problem solving using a commonality shared by all adults and younger students. It asks the learner to be a bit introspective and to share her/his human experiences.

The method is simple. A 'case' is presented before the class that involves a problem or conflict to be resolved. The problem may span many issues and controversies, but is usually one that the learner can relate to. This done as a verbal 'class motivator' and is effective in aiding the student to identify the main idea and topic to be worked with. Automatically, students note when discussion is heading towards a tangent. As supporting ideas and pieces of information are given, they are notated as such. After a 'warm-up,' an article is read in the class text "Annual Editions in Psychology 1983/1984." (Dushkin: Sluice Dock, Guilford, Conn.)

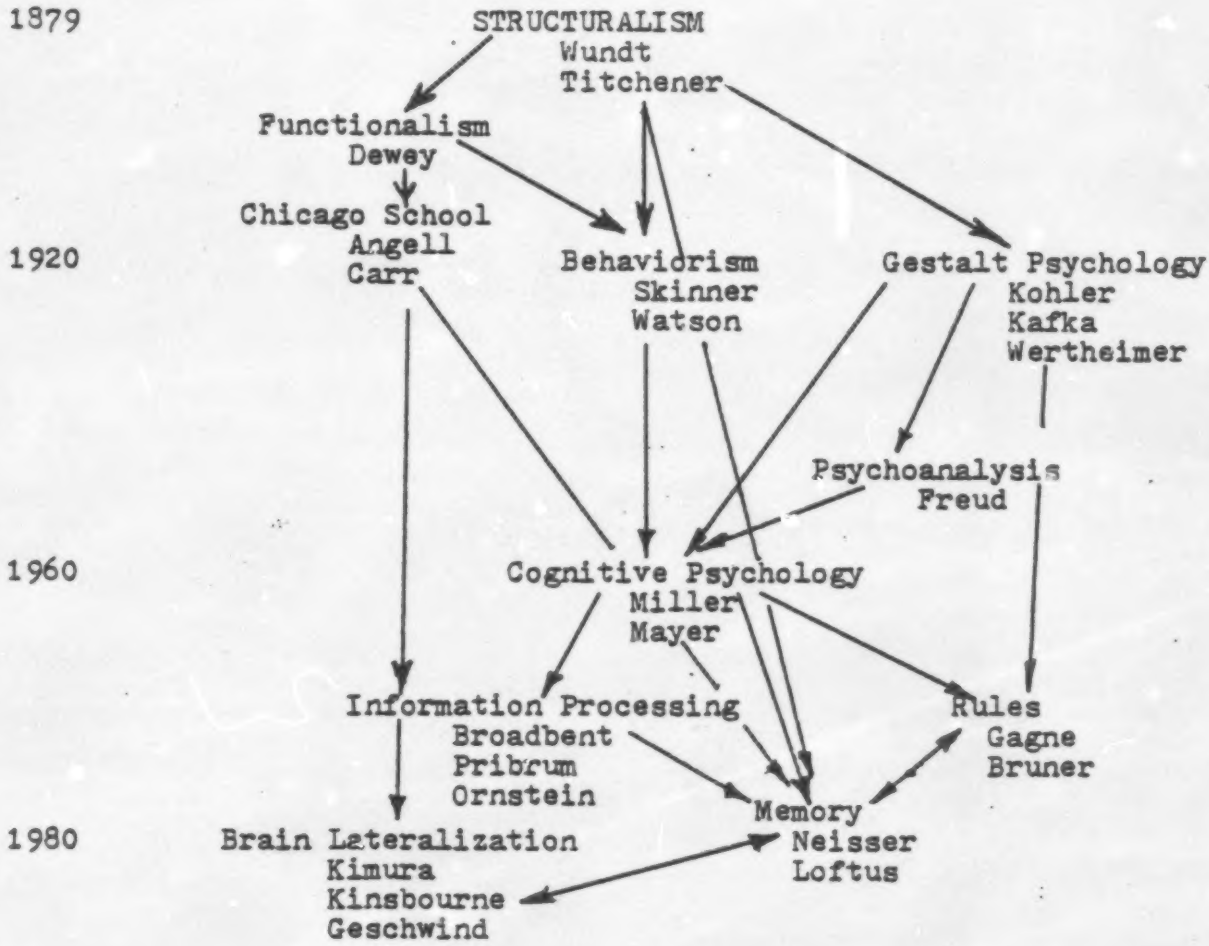
After the reading, fact is separated from opinion. The reading is followed by a written summary that expresses the author's opinion as well as the student's opinion. New vocabulary is reviewed and learned. The original case is re-inspected for new alternative ways of coping or solving the problem in light of the new information from the articles. New cases are generated by the adult either from common experiences or by building in new obstacles into the original case. Again, the solution's application must be generalizable to other situations.

As with the other aspects of the Adult Learning Environment as described by Frankel and Lindsey (1981) and Frankel (1981, 1982), the successful environment is one that allows for transfer of information across the curriculum. These same stages of developing strategies for problem solving are the core of PHI 100: Effective Reasoning and EDU101 Critical Reading and Analytic Thought. In these courses analogies and word problems are used and the process of solving them is discussed by and enhanced in the adult learner. The Basic Computations class, MATH 100, assists the adult by looking at solving word problems in similar logical progression of thought: defining the problem, isolating the variables, seeing how they can be manipulated, and applying a formula.

FUTURE RESEARCH

If this paper is to be true to its dictates, it, too, must generate ideas for future investigation. The author is currently working on a study that applies the strategies of problem solving to a task to see subject preference when that subject is a member of a defined population. The hypothesis is that members of a certain population demonstrate preference for particular strategies. An extension of this notion is the call for a precise definition of 'street savvy' and research on methods of problem solving used by this population.

A Geneology of Problem Solving



Bibliography

Bruner, Jerome The process of education. Cambridge, Mass: Harvard University Press, 1977.

Davis, Gary A. Creativity is forever. Cross Plains, Wisc.: Badger Press, 1981.

Duncan, C. P. Recent research on human problem solving. Psychol. Bull., 1959, 56, 397-429.

Frankel, Alan and Lindsey, William Structuring an adult learning environment. April 1981, ERIC ED216 196

Frankel, Alan Structuring an adult learning environment; Part Two: Teaching versus tutoring - the support services. November 1981, ERIC ED 210 624

Frankel, Alan Structuring an adult learning environment; Part Three: The team approach. September 1982, ERIC ED 216 196

Kidd, J. R. How adults learn. New York: Association Press, 1973

Knowles, Malcolm The adult learner: a neglected species. Houston: Gulf Publishing, 1978.

Kohler, W. The mentality of apes. New York: Harcourt Brace, 1925.

Kris, E. On preconscious mental processes. Psychoanalytic Quarterly, 19: 542 (1950).

Kubie, L. S. Neurotic distortion of the creative process. Lawrence: University of Kansas Press, 1958.

Loftus, Elizabeth Memory. Reading, Mass.: Addison-Wesley, 1980.

Luchins, A. S. Mechanization in problem solving. The effect of Einstellung. Psycholog. Monogr., 1942, 54 (Whole No. 248).

Maier, N.R.F. The behavior mechanisms concerned with problem solving. Psychol. Rev., 1940, 47, 43-58.

Maltzman, I. Thinking from a behavioristic point of view. Psychol. Rev., 1955, 62, 275-286

Mayer, Richard E. The promise of cognitive psychology. San Francisco: W.H. Freeman and Co., 1981.

Schachtel, E. G. The development of focal attention and the development of reality. Psychiatry, 1954, 17: 309.

Schultz, R. W. Problem solving behavior and transfer. Harvard Educ. Rev., 1960, 30, 61-77.

Skinner, B. F. Beyond freedom and dignity. New York: knopf, 1971.

Spearman, C. Creative mind. London: Nisbet, 1930.

Staats, A. W. Human learning. New York: Holt, Rinehart & Winston, 1964.

Osborn, A. F. Applied imagination. New York: Scribner's, 1953.

Wallas, G. The art of thought. New York: Harcourt, Brace, 1926

Wechsler, David The measurement and appraisal of adult intelligence. Baltimore: Williams & Wilkins, 1958.

Wertheimer, M. Productive thinking. New York: Harper, 1945.